REMARKS

- Claims 30-49, 60-78, 89-115, and 118-126 are pending.
- Claims 41, 95, 103-115, 118-119, and 123 have been amended.
- Claims 50-59, 79-88, 116-117 have been canceled.
- Claims 124-126 are new.

A clean copy of pending claims are attached for the Examiner's convenience.

I. Comment Regarding Applicant's IDSs

The Applicant thanks the examiner for tending to the Information Disclosure Statement (IDS) that Applicant submitted on June 10, 2004. However, Applicant also submitted another IDS on July 9, 2004, but Applicant has not received notification (i.e., an initialed Form 1449) with the September 9, 2004 office action that the July 9, 2004 IDS has been considered by the Examiner.

Accordingly, Applicant resubmits the July 9, 2004 IDS herewith. (It is submitted under separate cover in the hope that the IDS will not become lost at the PTO, which seems to have been a problem with earlier IDSs submitted for this application). Additionally, this resubmitted IDS contains additional materials that have recently come to light in litigation involving certain parent parents related to the instant application.

II. Indefiniteness

The Examiner has rejected claims 114 and 117 for indefiniteness. However, these claims have been amended/canceled, thus obviating this basis for rejection.

III. Art-Based Rejections

The Examiner states three bases for rejection of the claims:

- Claims 30-35 and 38-42 have been rejected under 35 U.S.C. § 102(e) as anticipated by USP 6,194,325 ("Yang")
- Claims 36-37 and 43-123 have been rejected under 35 U.S.C. § 103(a) as being obvious over Yang; and
- Claims 63, 75, 82, 89, 91-96, 102-103, 106, 109, and 113-123 have been rejected as anticipated by an article by Marks et al. ("Marks")[2].

However, these cited references (Yang; Marks) do not comprise prior art as to the inventions Applicant is claiming. This is because Applicant's claims are entitled to a filing date of June 15, 1992,[3] a date which precedes the earliest dates to which Yang and Marks could be entitled.

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[2] The Examiner refers to this article in the Office Action as "Marks et al. (5-19-93)." Because Applicant did not understand which reference this referred to, the undersigned attorney's assistant telephoned the Examiner to seek clarification on this issue. The attorney's assistant was told by the Examiner that the citation referred to reference C38 on Applicant's Information Disclosure Statement (IDS), which Applicant had cited as J. Marks et al., "Introduction of a New High Density Plasma Reactor Concept for High Aspect Ratio Oxide Etching," SPIE, Vol. 1803, pp. 235-47 (1992).

The publication date of the Marks reference, and/or the date in which the subject matter of the Marks reference might have been made public through disclosure, is not entirely clear. Applicant notes that the Marks reference was apparently published (i.e., copyrighted) in 1993, but comprises the proceedings of the meeting mentioned on its cover page, which apparently occurred on September 21-23, 1992. On this basis, and while not acquiescing as to any specific date, Applicant will assume for purposes of this Office Action response that the subject matter of the Marks reference was made public (through disclosure at the conference or by publication) on September 21, 1992, recognizing however that subsequent proof might provide further clarity on the exact date at which Marks would be deemed as public. Applicant also wishes to note that Marks cannot operate as prior art under Section 102(e), as the Examiner contends, because it is not a U.S. Patent Application which later was published or issued as a U.S. Patent.

[3] Applicant points out that it has recently appreciated an apparent error in its priority claim, essentially relating to the fact that it amended the specification to recite its full priority claim too late. Accordingly, Applicant filed herewith as a precaution, on October 13, 2004, a petition under 37 C.F.R. § 1.78(a)(3) to have Applicant's full

As evidenced by Applicant's amended specification and as reflected in this Application's filing receipt, Applicant claims priority to a date of June 15, 1992 by virtue of a string of continuing applications that have been filed leading up to the instant application. This string of applications is summarized below:

Serial #	*Filing Date*	*Relation to Earlier*	*Issue #*	*Issue Date*
07/898,505	15-Jun-92		5,286,344	15-Feb-94
08/152,755	15-Nov-93	Continuation-in-part of '505	5,880,036	9-Mar-99
08/905,891	4-Aug-97	Continuation of '755	6,015,760	18-Jan-00
09/344,277	30-Jun-99	Continuation of '891	6,287,978	11-Sep-01
09/923,058	06-Aug-01	Continuation of '277		

Presumably, the Examiner, in citing Yang and Marks against Applicant's claims, assumed that Applicant's claims were only entitled to a filing date of November 15, 1993—the filing date of Applicant's earlier continuation-in-part application (i.e., the '755 application). However, Applicant's pending claims clearly enjoy support in the even earlier '505 application filed on June 15, 1992, and hence are entitled to that date for prior art purposes.

To prove this point, Applicant recites its claims as amended herein below, and shows in brackets where the pertinent subject matter for each claim can be found in the '344 patent (i.e., the earliest-filed '505 application as it issued)[4]:

> 30. A method of etching a semiconductor wafer comprising a silicon oxide layer formed over a silicon nitride layer, the method comprising plasma etching the silicon oxide layer in an etchant environment comprising a fluorohydrocarbon, wherein the fluorohydrocarbon contains at least as many hydrogen atoms as fluorine atoms, and wherein the etchant environment provides silicon oxide-to-silicon nitride selectivity. **['344 patent, col. 4, ll. 24-36]**
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> 31. The method of claim 30, wherein the fluorohydrocarbon is CH_3F. **['344 patent, col. 4, ll. 24-36]**

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priority claim accepted as unintentionally delayed. A courtesy copy of this petition as filed without its attachments accompanies this response.

[4] The applicant cites to the '344 patent instead of the '505 application as it is assumed more accessible and easier for the Examiner to review.

32. The method of claim 30, wherein the fluorohydrocarbon contains the same number of hydrogen and fluorine atoms. **['344 patent, col. 4, ll. 24-36]**

33. The method of claim 32, wherein the fluorohydrocarbon is CH_2F_2. **['344 patent, col. 4, ll. 24-36]**

34. The method of claim 30, wherein the etchant environment further comprises a fluorinated gas. **['344 patent, col. 4, ll. 48-50]**

35. The method of claim 34, wherein the fluorinated gas is selected from the group consisting of CF_4 and CHF_3. **['344 patent, col. 4, ll. 48-50]**

36. The method of claim 34, wherein the etchant environment further comprises an inert gas. **['344 patent, col. 4, ll. 48-50]**

37. The method of claim 36, wherein the inert gas is argon. **['344 patent, col. 4, ll. 48-50]**

38. The method of claim 30, wherein the silicon oxide layer is formed directly above the silicon nitride layer. **['344 patent, Fig. 2 showing oxide 14 over nitride 16]**

39. The method of claim 30, wherein the silicon oxide is selected from the group consisting of undoped silicon oxide and doped silicon oxide. **['344 patent, col. 6, ll. 9-10]**

40. The method of claim 30, wherein the silicon nitride layer is formed with an uneven topography. **['344 patent, Fig. 2 showing oxide 14 over an uneven nitride 16]**

41. The method of claim 30, wherein the semiconductor wafer further comprises two conductors, wherein the silicon nitride layer is formed above the conductors, and wherein the plasma etching forms an opening in the silicon oxide between the conductors. **['344 patent, Fig. 2 showing nitride 16 over two polysilicon conductors 17, and forming an opening 12a in the silicon oxide 14 between them]**

42. The method of claim 30, further comprising heating the semiconductor wafer during plasma etching. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

43. The method of claim 42, wherein the semiconductor wafer is heated to between about 20 and 80 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

44. The method of claim 42, wherein the semiconductor wafer is heated to between about 30 and 60 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

45. The method of claim 42, wherein the semiconductor wafer is heated to between about 35 and 50 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

46. The method of claim 42, wherein the semiconductor wafer is heated by heating an electrode adjacent to the semiconductor wafer. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

47. The method of claim 46, wherein the electrode is heated to between about 20 and 80 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

48. The method of claim 46, wherein the electrode is heated to between about 30 and 60 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

49. The method of claim 46, wherein the electrode is heated to between about 35 and 50 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

60. The method of claim 30, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 10-to-1. **['344 patent, col. 5, ll. 15-18]**

61. The method of claim 30, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1. **['344 patent, col. 5, ll. 15-18]**

62. The method of claim 30, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1. **['344 patent, col. 8, l. 61]**

63. A method of etching a semiconductor wafer comprising a silicon oxide layer formed over a silicon nitride layer, the method comprising plasma etching the semiconductor wafer in an etchant environment, wherein the method comprises heating the semiconductor wafer during plasma etching to increase the silicon oxide-to-silicon nitride selectivity. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

64. The method of claim 63, wherein the etchant environment comprises a fluorohydrocarbon, wherein the fluorohydrocarbon contains at least as many hydrogen atoms as fluorine atoms. **['344 patent, col. 4, ll. 24-36]**

65. The method of claim 64, wherein the fluorohydrocarbon is CH_3F. **['344 patent, col. 4, ll. 24-36]**

66. The method of claim 63, wherein the etchant environment comprises a fluorohydrocarbon, wherein the fluorohydrocarbon contains the same number of hydrogen and fluorine atoms. **['344 patent, col. 4, ll. 24-36]**

67. The method of claim 66, wherein the fluorohydrocarbon is CH_2F_2. **['344 patent, col. 4, ll. 24-36]**

68. The method of claim 63, wherein the etchant environment further comprises a fluorinated gas. **['344 patent, col. 4, ll. 48-50]**

69. The method of claim 68, wherein the fluorinated gas is selected from the group consisting of CF_4 and CHF_3. **['344 patent, col. 4, ll. 48-50]**

70. The method of claim 68, wherein the etchant environment further contains an inert gas. **['344 patent, col. 4, ll. 48-50]**

71. The method of claim 70, wherein the inert gas is argon. **['344 patent, col. 4, ll. 48-50]**

72. The method of claim 63, wherein the semiconductor wafer is heated to between about 20 and 80 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

73. The method of claim 63, wherein the semiconductor wafer is heated to between about 30 and 60 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

74. The method of claim 63, wherein the semiconductor wafer is heated to between about 35 and 50 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

75. The method of claim 63, wherein the semiconductor wafer is heated by heating an electrode adjacent to the semiconductor wafer. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

76. The method of claim 75, wherein the electrode is heated to between about 20 and 80 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

77. The method of claim 75, wherein the electrode is heated to between about 30 and 60 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

78. The method of claim 75, wherein the electrode is heated to between about 35 and 50 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

89. The method of claim 63, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 10-to-1. **['344 patent, col. 5, ll. 15-18]**

90. The method of claim 63, wherein the silicon oxide-to-silicon nitride selectivity is greater than 20-1. **['344 patent, col. 5, ll. 15-18]**

91. The method of claim 63, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1. **['344 patent, col. 8, l. 61]**

92. The method of claim 63, wherein the silicon oxide layer is formed directly above the silicon nitride layer. **['344 patent, Fig. 2 showing oxide 14 over nitride 16]**

93. The method of claim 63, wherein the silicon oxide is selected from the group consisting of undoped silicon oxide and doped silicon oxide. **['344 patent, col. 6, ll. 9-10]**

94. The method of claim 63, wherein the silicon nitride layer is formed with an uneven topography. **['344 patent, Fig. 2 showing oxide 14 over an uneven nitride 16]**

95. The method of claim 63, wherein the semiconductor wafer further comprises two conductors, wherein the silicon nitride layer is formed above the conductors, and wherein the plasma etching forms an opening in the silicon oxide between the conductors. **['344 patent, Fig. 2 showing nitride 16 over two polysilicon conductors 17, and forming an opening 12a in the silicon oxide 14 between them]**

96. A method of etching a semiconductor wafer containing a silicon oxide layer formed over a silicon nitride layer, the method comprising plasma etching the semiconductor wafer using an etch environment that provides a silicon oxide-to-silicon nitride selectivity of greater than or equal to 10-to-1. **['344 patent, col. 5, ll. 15-18]**

97. The method of claim 96, wherein the etch environment comprises a first gas selected from the group comprising CH_3F and CH_2F_2. **['344 patent, col. 4, ll. 24-36]**

98. The method of claim 97, wherein the etch environment further comprises a second fluorinated gas. **['344 patent, col. 4, ll. 48-50]**

99. The method of claim 98, wherein the second fluorinated gas is selected from the group consisting of CF_4 and CHF_3. **['344 patent, col. 4, ll. 48-50]**

100. The method of claim 98, wherein the etch environment further comprises an inert gas. **['344 patent, col. 4, ll. 48-50]**

101. The method of claim 100, wherein the inert gas is argon. **['344 patent, col. 4, ll. 48-50]**

102. The method of claim 96, further comprising heating the semiconductor wafer during plasma etching. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

103. The method of claim 102, wherein the semiconductor wafer is heated to between about 20 and 80 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

104. The method of claim 102, wherein the semiconductor wafer is heated to between about 30 and 60 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

105. The method of claim 102, wherein the semiconductor wafer is heated to between about 35 and 50 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

106. The method of claim 102, wherein the semiconductor wafer is heated by heating an electrode adjacent to the semiconductor wafer. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

107. The method of claim 106, wherein the electrode is heated to between about 20 and 80 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

108. The method of claim 106, wherein the electrode is heated to between about 30 and 60 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

109. The method of claim 106, wherein the electrode is heated to between about 35 and 50 degrees C. **['344 patent, col. 4, l. 67 to col. 5, ll. 13]**

110. The method of claim 97, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1. **['344 patent, col. 5, ll. 15-18]**

111. The method of claim 97, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1. **['344 patent, col. 8, l. 61]**

112. The method of claim 97, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 50-to-1. **['344 patent, col. 5, ll. 15-18]**

113. The method of claim 102, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1. **['344 patent, col. 5, ll. 15-18]**

114. The method of claim 102, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1. **['344 patent, col. 8, l. 61]**

115. The method of claim 96, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1. **['344 patent, col. 5, ll. 15-18]**

118. The method of claim 96, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1. **['344 patent, col. 8, l. 61]**

119. The method of claim 96, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 50-to-1. **['344 patent, col. 5, ll. 15-18]**

120. The method of claim 96, wherein the silicon oxide layer is formed directly above the silicon nitride layer. **['344 patent, Fig. 2 showing oxide 14 over nitride 16]**

121. The method of claim 96, wherein the silicon oxide is selected from the group consisting of undoped silicon oxide and doped silicon oxide. **['344 patent, col. 6, ll. 9-10]**

122. The method of claim 96, wherein the silicon nitride layer is formed with an uneven topography. **['344 patent, Fig. 2 showing oxide 14 over an uneven nitride 16]**

123. The method of claim 96, wherein the semiconductor wafer further comprises two conductors, wherein the silicon nitride layer is formed above the conductors, and wherein the plasma etching forms an opening in the silicon oxide between the conductors. **['344 patent, Fig. 2 showing nitride 16 over two polysilicon conductors 17, and forming an opening 12a in the silicon oxide 14 between them]**

124. The method of claim 41, wherein the conductors are comprised of polysilicon. **['344 patent, col. 6, l. 28]**

125. The method of claim 95, wherein the conductors are comprised of polysilicon. **['344 patent, col. 6, l. 28]**

126. The method of claim 123, wherein the conductors are comprised of polysilicon. **['344 patent, col. 6, l. 28]**

When it is understood that Applicant's claims are entitled to an effective filing date of June 15, 1992, it is clear that both Yang and Marks are ineligible to act as prior art references to defeat the patentability of Applicant's claims.[5] The Yang '325 patent, itself based on a continuation-in-part application, was filed on December 4, 1995, and its parent application (07/941,501, now USP 5,423,945) was filed on September 8, 1992, both of which occurred after Applicant's effective filing date of June 15, 1992. The Marks reference, as far as is clear from that reference, apparently could not be entitled to a date any earlier than September 21, 1992.[6]

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[5] If anything, Yang actually helps to show the patentability of certain aspects of Applicant's claims, particularly claims such as claim 96 dealing with Applicant's claimed oxide-to-nitride selectivity ratio of greater than or equal to 10-to-1. In Yang's earliest disclosure, USP 5,423,945, filed September 8, 1992, Yang acknowledges that as of the time Applicant's first application was filed, oxide-to-nitride selectivity ratios "of over about 10:1, and even 30:1 and 40:1" are required for state of the art devices, and therefore that "it would be highly desirable to provide an etch stop process for etching oxides over nitrides with high selectivities of over 10:1." Yang, '945 patent, col. 1, ll. 32-36. Yang also acknowledges that "a selectivity over about 8:1 of silicon oxide to silicon nitride has not been achieved to date." Yang, '945 patent, col. 1, ll. 28-30; see also col. 2, ll. 32-34.

This evidence that the art had sought higher selectivities, but had been unable to achieve such selectivities until Applicant's invention, shows that Applicant's claimed selectivity ratios are critical, and hence patentable.

[6] See footnote 2, discussing this issue in further detail.

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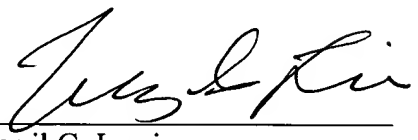
Applicant submits that pending claims 30-49, 60-78, 89-115, and 118-126 are patentable, and requests the issuance of a Notice of Allowance.

Respectfully submitted,



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